Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 15 of the Commission's Rules Regarding Spread Spectrum Devices	)	ET Docket No. 99-231
	)	
Wi-LAN, Inc. Application for Certification of an Intentional Radiator Under Part 15 of The Commission's Rules	)	DA 00-2317

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COMMENTS OF Wi-LAN, INC.

A. Introduction:

Wi-LAN hereby files Comments on the Further Notice of Proposed Rule Making (FNPRM) in the above captioned proceeding[1]. It is our understanding, that by means of this FNPRM, the Commission proposes to amend the rules in Section 15.247 governing unlicensed spread spectrum intentional radiators. In general, the Commission proposes that digital modulation techniques, such as Orthogonal Frequency Division Multiplexing (OFDM), be added to the existing rules for Direct Sequence Spread Spectrum (DSSS) systems in the 915MHz (902-928MHz), 2.4GHz (2400-2483.5MHz) and 5.8GHz (5725-5850MHz) bands. In addition, the Commission also proposes to eliminate the Processing Gain requirements found in this section altogether. Finally, as part of this FNPRM, the Commission proposes to allow a minimum of 15 non-overlapping channels irrespective of the bandwidth utilized for adaptive Frequency Hopping Spread Spectrum (FHSS) systems operating only in the 2.4GHz band, at a maximum power output of 125mW. Wi-LAN supports these rule making initiatives by the Commission.

Wi-LAN is an innovator in the development of spread spectrum and digital modulation technologies and an equipment manufacturer employing these technologies. Wi-LAN's patented Wideband - Orthogonal Frequency Division Multiplexing (W-OFDM)[2] and MultiCode – Direct Sequence Spread Spectrum (MC-DSSS)[3] technologies are both ideal and well suited for use in the unlicensed 2.4GHz and 5.8GHz spectrums for intentional radiators. Thus enabling broadband wireless services in these bands, offering the consumer public the best available choice for high-speed wireless Internet access, that is spectrally efficient and quick to deploy. At the same time, facilitating user co-existence with other authorized services, not causing harmful interference and accepting interference received as per Part 15 conditions[4].

Wi-LAN applauds this "Further Notice" by the Commission, because it removes the definitional ambiguity concerning what constitutes a spread spectrum system and the unfortunate prejudice toward the introduction of new technologies that offer spectral efficiency in increasingly congested areas and broadband capability in the specified affected bands.

B. Digital Modulation Peak Power Spectral Density:

Wi-LAN supports proposed peak power spectral density (PSD) requirements for new digital technologies. This parameter ensures that the spectrum characteristics of potential digital modulation technologies are like DSSS spectrum characteristics, thus validating that such a digital modulation system will not cause interference to other devices than direct sequence spread spectrum systems. The existing peak PSD level of 8dBm/3kHz in the 915MHz, 2.4GHz and 5.8GHz bands for DSSS devices is

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[1] *Amendment of Part 15 of the Commission's Rules Regarding Spread Spectrum Devices*, ET Docket 99-231, Further Notice of Proposed Rule Making & Order, FCC 01-158, Released: May 11, 2001

[2] *Method and Apparatus for Multiple Access between Transceivers in Wireless Communications using OFDM Spread Spectrum* (U.S. patent # 5,282,222)

[3] *MultiCode Direct Sequence Spread Spectrum* (U.S. patent # 5,555,268)

already in place and devices authorized for use meeting this requirement are not reported to be causing interference in these bands.

It should not be necessary to further reduce this peak power spectral density level for digital modulation technologies, because it already adequately restricts the transmission energy concentrated in a narrow portion of the emission bandwidth, ensuring comparable direct sequence power spectral density characteristics, already controlling and minimizing interference impact to other devices. As a "peak" power requirement, an additional built-in safeguard minimizing interference is already imposed on any transmissions from direct sequence and digital modulation technologies.

C. Digital Modulation Power Output:

The Commission proposes to allow the same maximum peak power output of 1Watt for digital modulation systems in the 915MHz, 2.4GHz and 5.8GHz bands as afforded existing direct sequence spread spectrum technologies. Wi-LAN supports this proposal and agrees with the Commission that such a move would provide performance certainty for equipment manufacturers and increase consumer choice.

Since digital technologies such as OFDM and direct sequence spread spectrum systems both generate similar spectral signatures, the same power output level for digital technologies will not generate more interference in the designated bands any more so, than do currently authorized direct sequence systems. Digital technologies authorized for use in the designated bands will require at least the same power levels as other DSSS technologies in order to provide comparable and competitive

[4] 47 C.F.R. § 15.5

performance characteristics that will improve user choice and offer broadband performance enhancements.

Because digital modulation technologies have to meet the aforementioned PSD rule, the Commission should not consider further reductions in power output level as imposed on wideband frequency hopping systems, as these do not have to meet a qualifying peak power spectral density requirement, whereas digital modulation technologies will have to, and they must meet identical direct sequence PSD requirements applied to DSSS technologies.

The Commission invited comment on the question, whether an additional corresponding antenna gain restriction should be imposed for point-to-point operation, if a reduction in power output for digital modulation technologies was considered? Wi-LAN asserts that this hypothetical action should not be taken nor be deemed necessary because of the very directional characteristics of high gain antennas utilized in point-to-point links.

Comment was also invited by the Commission as to whether an alternative U-NII (Unlicensed – National Information Infrastructure)[5] rules amendment to include 915MHz and 2.4GHz bands should be considered instead? Wi-LAN notes the apparent U-NII alignment with the proposals in this "Further Notice" in the 5.8GHz band, because the U-NII rules permit the use of wideband digital modulation technologies. However, we believe that the Commission's proposal of amending section 15.247 to include digital modulation technologies provides a more open and flexible approach, since the rules for U-NII devices were considered and designed specifically for short range, less spectrally efficient, Wireless Local Area Network (WLAN) devices that would support the realization of the National

Information Infrastructure. As an aside, Wi-LAN feels that extending the upper U-NII band to 5725-5850MHz would benefit manufacturers and the public.

D. Elimination of Processing Gain:

Wi-LAN supports the Commission's proposal to remove the existing processing gain requirement from the rules concerning direct sequence and hybrid systems and not imposing them on new digital technologies.

Wi-LAN agrees with other manufacturers and the Commission that the method of measuring processing gain is complex, controversial, and impractical, resulting in very little, if any, value imparted to the requirements process.

A digital modulation technology such as W-OFDM provides interference immunity with a collective of methods providing inherent processing gain utilizing forward error correction (FEC) techniques, Fast Fourier Transform (FFT) gain and the use of multi-carriers enabling multipath channel and narrowband noise rejection.

It is incumbent on any manufacturer of direct sequence and comparable digital modulation technologies to accept interference that may exist in the shared unlicensed bands of 915MHz, 2.4GHz and 5.8GHz, which co-exist with not only other spread spectrum devices, but also with Industrial, Scientific and Medical (ISM) and U-NII devices authorized for use. Market expectations will demand that equipment manufacturers design in adequate interference rejection performance with respect to system and receiver characteristics.

[5] 47 C.F.R. Part 15, Subpart E

E. Frequency Hopping Systems:

Wi-LAN supports the Commission's proposal to allow a minimum of 15 hopping channels in the 2400-2483.5MHz band only, regardless of the channel bandwidth utilized, providing the output power does not exceed 125mW and since the proposal is also eliminating the 75MHz hopping span requirement, intelligent adaptive hopping shall be used instead. Mandatory use of adaptive hopping techniques could be precluded if the 75MHz minimum span is maintained.

F. Conclusion:

The Commission should adopt its proposed rule changes for section 15.247, which add digital modulation technologies, eliminate the processing gain requirement and allow frequency hopping as specified.

Respectfully submitted,

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August 30, 2001